Ted Nelson's keynote to the CyberArts International conference, 7 Sep 90.

VIRTUAL WORLD WITHOUT END

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Summary .

The gold rush is on. The hypermedia are happening. But which? Where? Whose?

Whatever we call it, here come interactive graphics, text, video, all somehow user-chosen. But how will they tie together? And what about cyberspace and virtual reality, disks and digital libraries, high-bandwidth communication? If producers knew where all this was going, the rush would rival the Talkies. Each manufacturer says his gizmo will be the center of it.

Whatever it is will be very new. But what will it look like? What will it run on? Where will we keep it? How will we connect it? Where do I fit in? What's in it for me? And perhaps most important, What's in me for it?

As always a torrent of technicalities hides simple truths. Talent, not technicality, will be the limiting commodity. Each user has at most 24 hours a day. Complicated setups will be little used. And incompatible things will fade quickly. It all has to tie together. There cannot be island universes.

The problem is putting together the ideas, not the equipment. More people must learn more faster than ever before if we are to survive. This means the user must freely go through magic doors, turning corners from world to world to world, keeping track of what happens on the way. And our new media must merge production values from many technical sources, melding portions of many pre-existing productions into new and greater hyperworks in the hands of tomorrow's producers and artists.

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[OPENER]

You hear today about "Virtual Reality," meaning computer-based three-dimensional worlds. But "virtual" means something much larger: *as-if*, the way something seems to be. Virtuality means the *seeming* of what we create, and the appearance of things is the true center of software design.* Our world becomes increasingly virtual, as its appearance departs more and more from depending on the structure of physical reality. Movies and television, moving signs, recorded music and sound, the illusory continuities of broadcasting stations and political parties, all these are virtual.

Deciding the fundamental ideas of our mental and electronic universe seems to me one of the most important tasks of all, and it is the design of virtuality. I will present here that virtual universe of the mind that I and my colleagues have been working on for many years.

In 1960 I was a young academic and aspiring film-maker, but something happened to delay these pursuits. I had a vision of new computer media and the delivery system they would need. I knew there would be interactive movies and interactive texts, and we would need an interactive publishing system to make them available.

But somehow this was not obvious to everybody, nor is it yet.

In my youth I had heard that computers were mathematical, engineering sorts of thing. And you had to know a lot of math, and what they were really for was doing statistics, bookkeeping and astronomy, but there were some obscure interesting things about them. Well, all this sounded fishy to me; I had to know. So I took a computer course in graduate school.

And here in the textbook was a screen, you see, that could be attached to the computer. A screen! On which the computer could make patterns of dots. How about that. Now here's a picture in the newspaper. What is it close up?-- patterns of dots! There's no picture you couldn't put on the screen! And you could store the picture, you could change it by the computer's responding to you. Together you and the computer could do anything.

That story about mathematical computers had been a lie, a coverup. They'd been hiding this thing. Under the rug was the most wonderful machine you ever saw. You could do anything with it. In the hands of an artist, in the hands of a filmmaker, in the hands of a writer it could become anything. This was the answer to my biggest problem-- how to organize writing (something the programmers don't understand yet).

So I figured, holy smoke! I'll have to do something about this.

***Theodor Holm Nelson, "Interactive Systems and the Design of Virtuality" (in two parts), *Creative Computing*, November 1980 and December 1980.**

We are talking the future of civilization here. How we handle ideas and writings and theother media is at the center of everything. The final form that the human heritage takes is *literature*, the collection of writings and ideas and memories we save. I saw that there had to be a whole new computer-based system for the literature of the future.

And I thought *I* had to do it for a very simple reason--if I didn't do it, *they* would, and they'd screw it up. Unless the new literary system were clean and unless it were simple, our human future would be crippled.

That was thirty-two years ago. And what I consider the most fundamental tool of human thought does not yet exist, and the work I put on hold remains unfinished. So far.

THE 2020 VISION

The vision I had in the fall of 1960 was very simple and can be very simply stated. It was so simple it confused people totally. They thought, "That must not be what he means."

The idea is this. Imagine the year 2020. Billions of people, including you, are at their computer screens around the planet. And each of you is able to draw to your screen, from a common document repository of humankind, any fragment of text, graphics, audio or video.

DEMAND PUBLISHING

In other words, universal electronic publishing. *Demand* publishing, meaning things come on request, right away.
Delivery is fragment by fragment, each fragment coming at a user's request. (A whole document is delivered as a series of fragments.) You pay by the byte for what you take.

FROM OWNED DOCUMENTS

Everything sent will be a portion of a some stored *document*, that is, a planned contribution created and owned by some individual or publishing company. The document can be a piece of text, an illustration, a piece of recorded music, a part of a musical score, a photograph, a painting, sheet music, a segment of video, a piece of laboratory data, an architectural design. Or it can be a conglomerate including all these types, or any other kind of information that can be stored electronically.

People often say loosely, "We'll have all the information in the world on line." Well, I don't know what that means. The word "information" is suspect; it means too much and too little. Who owns "information"? Who takes care of it and makes sure it's up to date?

There are these things out there called *databases*-- packages of granular information, like file cards-- and so much of what's in them is suspect, as is the usefulness of the more advanced database queries. You make these complicated structured queries and the answer comes back: "42." You got an answer, but you don't know what you got. Data bases of this type have reached their limit.

But the real, understandable, common heritage of humankind boils down to *documents*. Notice I do not say information or data or knowledge. Because these words, "information" and "data" and "knowledge," are kind of slippery and amorphous like a zip-lock *[note to editor: this spelling avoids trademark problem]* bag full of water.

But I know what a document is. A document is some kind of information package that some author created. Somebody signed it or took responsibility for the contents. And that gives you a social handle on where it's coming from, and that title tells you that this person or persons who created it created it with some objective in mind, and the continuity of the title over different editions tells you more still. So the notion of a document is in some sense psychological and social, as well as literary.

A *document* is an information package that someone creates, and *literature* is a system of interconnected documents. Each academic subject has its own "literature"-- the literature in biology, the literature in economics. And then including them we have *all* literature, the much greater interconnected whole of which the others are a part, a vast interconnected system of information packages.

And what we need, as we read, is to follow connections. And that is what hypertext, and the new interactive arts, are about.

WITH PRETTY FAST DELIVERY

How fast will it come from the repository network? As "instantaneously" as a phone call gets through, which of course varies.

FROM A SERVER NETWORK

Tomorrow's literary system will not be on a single gigantic mainframe, of course; it will be distributed on server machines throughout the world, coordinated by software into a single functioning delivery system.

DIGITAL, ERROR-FREE AND PLAYABLE

Because it is in digital form, the material comes without error, and your computer screen machine becomes a player with which to read, view, hear or examine what you have summoned.

WITH ROYALTY

And for each piece you automatically pay a small royalty to its publisher, as well as delivery charges to the service providers who store and ship it to you.

COME THE NEW INTERACTIVE ARTS

This would not be simply for yesterday's sequential paper documents, of course, but for tomorrow's new branching and interactive media-- *hypertext* and *hypermedia*, as I was to name them later (in 1965). Today's novelty term, "interactive multimedia," is used so it will sound new; its popularizers avoid the synonym *hypermedia*, which would reveal that the idea has been around for decades.

These interactive arts would not have linkages and options merely *within* individual packages (like today's closed hypertexts and hypermedia titles), but *between* the packages as well, links between documents.

A NEW PLURALISM

Because the different documents could have different authorship and points of view, the whole would be what we now call a *pluralistic docuverse*.

OF OPEN HYPERMEDIA PUBLISHING

And that would lead to the biggest idea of all-- *open hypermedia publishing*.

Now, open hypermedia publishing means the following: It means that anyone can publish a connection to another document. And a reader of the original document can say, "Who has published connections?" and go to any of the connected contributions by others-- comments, disagreements, addenda, variora.

These ideas all hit me at once, a long time ago. Such a simple vision. But radical, and very confusing to people in the nineteen-sixties. Now more and more different people understand different parts of the idea, but few seem to understand it whole, even today.

What holds us back remains, as then, sluggish ideas. Then it was fear of computers. Now, we are held back by the terrible slogan that the Macintosh enthusiasts brought out, "Wizzywig"-- the most insidious piece of propaganda on behalf of stupidity that was ever contrived. Actually spelled WYSIWYG, it stands for "What you see is what you get."

What does that mean? Here I am at the screen. What I see is what I see, right? So what does "get" mean? It means *what comes out on the printer*, doesn't it? That's right, folks. WYSIWYG means we're going to use this magnificent piece of equipment, this incredible technological achievement, as a *paper simulator;* we will limit this extraordinary device, capable of enacting any set of instructions the mind of woman or man can devise--we're going to use this incredible enactor to pretend to be the surface of flattened wood pulp. (Imagine the imaginary forest that had to be cut down to make this virtual sheet of paper.) This is like using a 747 as a bus on the highway.

The alternative, of course, is to use the computer screen to show the *real structure* and interconnections of things-- polymorphic and multidimensional. But instead Macintosh Wizzywig simulates superficial disconnected mess, the images of paper sheets and the clutter of separate papers on your desk; and gives us no general software to show you how documents and ideas are *related.*

HYPERTEXT & THE INTERACTIVE ARTS

Thoughts are not two-dimensional, but until now the process of expressing ourselves on paper has been breaking the multidimensional connections of thought down into little pieces and putting them all in a sequence on two-dimensional paper.

Why should we want to do that? Because paper was what we had. Now, on the computer and its screen, we have two choices. One, we can go on breaking the thoughts into a two-dimensional structure and plastering them on simulated paper, using the computer to simulate this two-dimensional Wizzywig array of flat thought.

Or, two, we can keep the thoughts in their true, multidimensional structure and create reading and presentational arrangements that will let the reader traverse them in any direction and in any way he or she sees fit. And this, to me, is the most obvious and yet powerful thing about the computer screen world: *ideas needn't be separated any more.*

So the term "hypertext" I define simply as *non-sequential writing*-- links, possible connections to follow, reading opportunities in different directions. "Hypermedia" correspondingly means *interactive presentations.*

There are now many hypertext software products, and hypermedia, but they are amazingly incompatible. As yet there is no common data structure for these interactive arts, so what we need in order to define this arena-- one of the things the world needs most-- is a common system for representing and delivering them. (Not simply a low-grade player machine, as certain large companies have tried to tell us, but a grand-scale coordinate system for the documentary world of the future, and a way to navigate on it.) And that is what the Xanadu group has been creating.

THE XANADU ™ HYPERMEDIA SERVER

The question is, how do you go about building the world repository library? Answer: You write the software-- software that will show all the connections that different people contribute, all the connections you need to keep track of.

This is what the Xanadu system is: a software package for *keeping track of interconnections of every kind*-- the interconnections of ideas; the interconnections of quotations; and the interconnections of documents. Xanadu is one piece of software carrying out this one idea across a whole spectrum of needs, from the office to the vaunted system for universal electronic publishing, a single concept which has a global interpretation and a minute interpretation, both of which are really the same.

Xanadu is a literary system, in my preferred sense of "literature:" it deals with *documents and their interconnections*. This works for published documents or the private documents an office will have.

The Xanadu office system (sometimes called "Little Xanadu") is just the same as the Xanadu publishing system (sometimes called "Big Xanadu")-- a system for storing and delivering connected documents, multimedia and hypermedia objects.

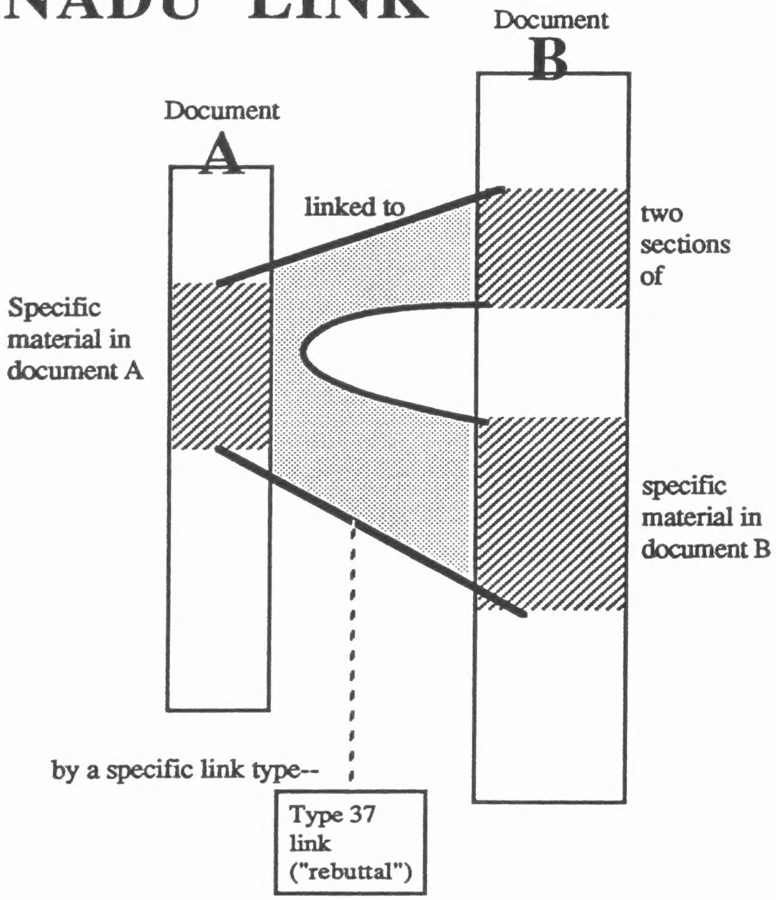
In both the office system and the publishing system, users at screens identically put in requests and the material flows out to supply those requests; except that in Xanadu publishing, the system transmits an automatic royalty from the user to the publisher of every fragment delivered to that user.

What the software principally provides is a generalized way to represent interconnection in documents of every kind, even though they are changing. Xanadu software handles that by two mechanisms, keeping track of two fundamental connections: *links* (of all kinds) and what we call *transclusions*.

1. THE XANADU LINK

The generalized link of Xanadu goes between spans, or pieces within a document or work selected by whoever made the link. A good way to visualize a Xanadu link is as a strap between a collection of bytes on the left and a collection of bytes on the right-- and neither collection need be all together.

XANADU LINK



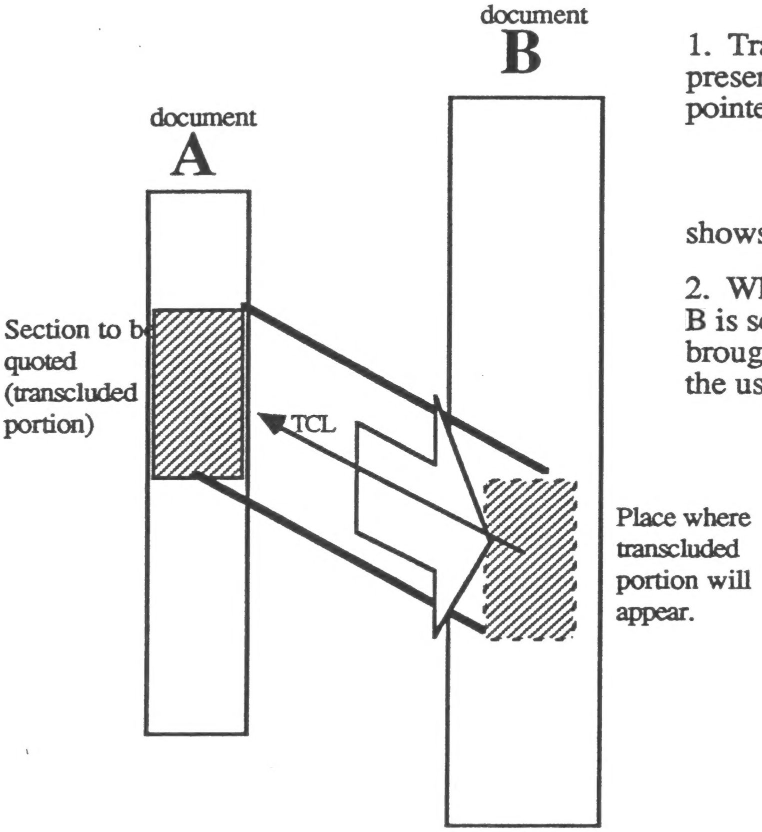
2. TRANSCLUSION

Transclusion is the other fundamental method in the Xanadu system.

Anything stored in Xanadu can be a combination of new sections and old sections stored in previous versions. The old sections are brought in whenever needed, but their origin is always noted. Transclusion can always show us the origins of what we're looking at, even in a complicated merged document. This sounds inefficient, and in some ways it is, but it cleans up so many issues,that Xanadu has been built around it.

Transclusion shows us what comes from where, because a *quoted piece is not copied.* Instead, it is brought in from its original storage when needed; but it is considered *part of* the new document, just as a family member not present at a celebration is still part of the family. We call this *transclusion* because the inclusion takes place across a document boundary.

TRANSCLUSION


document
B
document
A
Section to be quoted (transcluded portion)
TCL
Place where transcluded portion will appear.

1. Transcluded section is not actually present in document B; a transclusion pointer ▼TCL

shows where to go to get it.

2. When the transcluded part of document B is sent for or read, it is automatically brought from document A, summoned by the user's screen machine.

So the idea of transclusion is that something from one document can be used in another document without copying it. It is represented in the second document as a special hidden pointer that says, "whenever you get to this pointer, bring over the piece from that other document." This transcluded piece is intrinsically part of both documents, though its place of origin is special, and called its *native home*.

Transclusion solves, to a large extent, the copyright problem, the updating problem, the versioning problem, and the boilerplate problem. I won't go into what these problems are, but if you know what they are you can see that this is a good thing.

A DATA STANDARD

The Xanadu model also provides us with a possible basis for data standardization.

One of today's great and growing issues is how we can recapture a usable and organized world out of the jumble and morass we find now of files that are lost everywhere in different formats.

Each new program for a given purpose is typically different from most *other* programs for similar purposes, and creates stored material-- files and the data structures they contain-- that are likewise different from the files stored by the other programs for similar purposes.

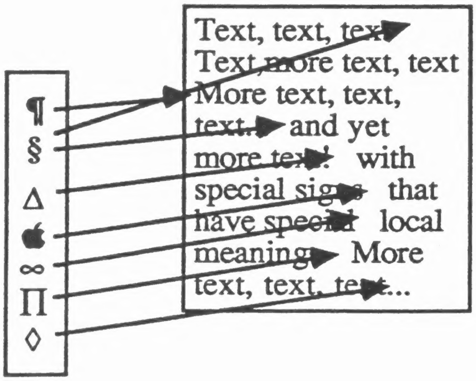
In other words, most computer applications usually have their own incompatible data structures. Programmers choose a way to represent something-- say, text or graphics-- that is, some mixture of pure data and code markers:

Data Structure Studded with Markers

> Text, text, text §
> Text,more text, text
> ¶More text, text,
> text...§and yet
> more text! Δwith
> special signs that
> have special ∞local
> meaning. ∏More
> text, text, text...◊

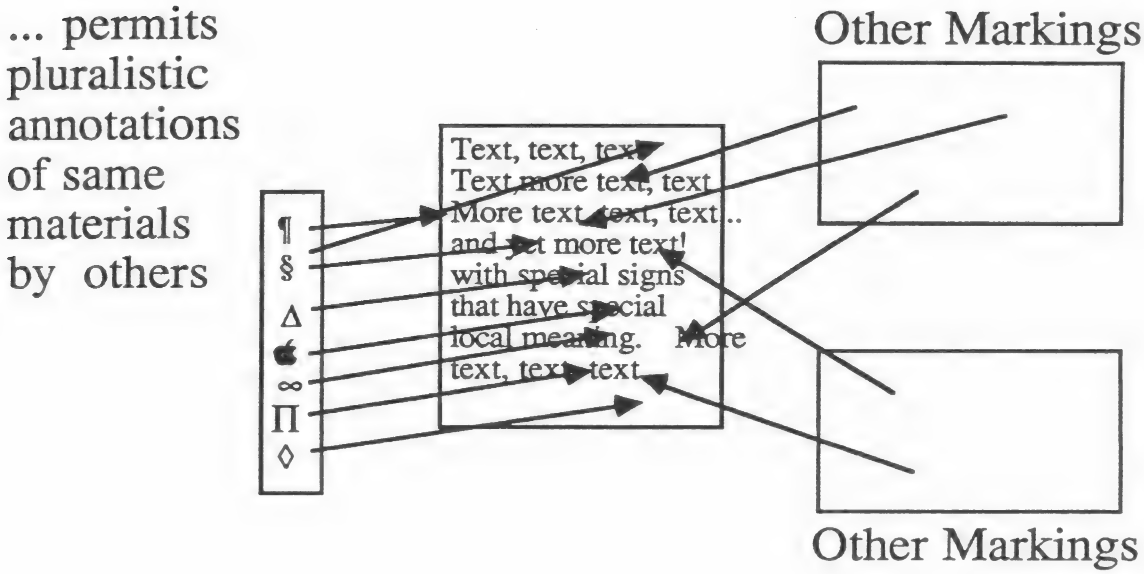
Now, the code markers tend to be different for each program, and this is getting worse and worse in every area, because every programmer has the right to do it his way. Incompatibility grows and the data word grows daily more muddled.

But suppose we pursue a different vision: one of keeping clean data by itself, without embedded codes, and marking it by pointers off to the side. For text, the clean textual data will be the alphabetical characters, spaces and punctuation; and we will move the data markers off to a separate package-- the markers for italics, beginnings of paragraph, and so on.



Same Data Structure, Broken Out as Separate Collection of Pointers

And what that means is that you can scan through the clean text and look for things in it. It also means that you can have *different* boxes of markers off on the side that don't interfere with each other.



So that everyone can mark up the same material without contradicting the other stuff. And that's what we have to have in a pluralistic docuverse.

THE OFFICE FOULUP

No doubt most of you are familiar with not knowing what's in your computer files--not knowing how they're connected. What the typical office is now, in case you haven't noticed, is an accumulation of mysterious and unknown disks and files with mysterious names. We don't know where they came from or which ones quote from where. We all suffer from this problem because we don't have transclusion and we don't have linkage built into existing computer systems. What we need, I believe, is a complete revision of the way that things are stored so as to keep track of what comes from where, and what the origins, differences and connections are.

Moreover, the computer files tend to be inaccurate. We are not keeping clean computer records because users still regard paper as the final and canonical form-- because the paperdigm (including WYSIWYG) is still the dominant model. A document is considered finished when some last page has been corrected with white-out. So what's in the computer is often corrupt, left behind by its paper shadow.

We cannot get these things cleanly organized until we decide the electronic version is the final and canonical copy.

So what the office really needs is a seamless and integrated pool of clean electronic documents whose interrelations are known, rather than this jumble; a seamless pool of contents which can easily be put into different combinations (documents, versions) and reused in clean and understandable ways. It means also being able to replace those stinky little file names with more sensible designations. This and more is what the Xanadu software is intended to do.

THE WORLD REPOSITORY

At the beginning I spoke of the 2020 Vision, the World Publishing Repository. This will use exactly the same connection mechanisms as the office software. And it will be on an enormous scale, potentially for trillions of linked documents. This is what our software is intended to do.

Now the notion of open hypertext publishing that I've mentioned is that anyone can add linked documents at any time which are visible at both ends of the link, even when a library gets huge. That's the hard part.

But there are many issues for such a system.

A. PRIVACY

There are fundamental issues of *privacy*.

For example, you sure don't want people keeping track of what you read. That's fundamental, but not necessarily obvious, because there are all of these good pretexts someone might have for wanting to keep track of what people read-- such as research. But the overwhelming, preponderant argument is that we must not keep track of what people read because then somebody-- government or employers-- make that spying a the basis for how people get treated. Which then constricts what everybody reads, and we start reading for show, building a phony profile. Such a world would be intolerable.

(But note that we need the same seamless document environment in the world of private documents, with the additional proviso that they may link to and transclude public documents. Even for private documents, linkage and transcusion are vital facilities, and we need these features for our regular private document traffic-- especial e-mail and teleconferencing.)

Then there are fundamental issues of freedom.

B. FREEDOM TO READ

Everyone should shoud be free to read whatever is published. Some people want to create degrees and restricted modes of publication. This is dangerous for many reasons. I believe there should be only two degrees of availability: "published" and "private," under private control, so we do not have to outmaneuver supervisors or censors who consider particular people unqualified to read something.

C. FREEDOM TO PUBLISH

Furthermore, everyone must be free to publish. The power of publishing*

***(I don't mean "desktop publishing," which is a misnomer for *layout*..)**

has always been in the hands of the people-- we call it "Freedom of the Press"-- but there is always someone who wants to restrict it.

Some information systems distinguish between "information users," or peons, and "information providers," or lords, who must put a great deal of money up front. This is intolerable. In our era more than ever, the only sensible assumption is that anyone may have something important to say, and has the right to say and publish it-- and in the electronic era, the price of publishing will be going *down.*

My book *Literary Machines* just got a new chapter last week because I got around to it. That's how I like it. Sure I'd sell more copies of the book if I gave it over to a conventional publisher, but I wouldn't like it. People say, "Ted, why do you publish your own books? Why don't you go to a real publisher?" And that makes my blood boil. I am a real publisher. Anyone who publishes a book is a real publisher. The power of publication must remain in the hands of the people. Strangely, publishing is one of those terms that a lot of people don't quite understand. This is very odd. I think they don't understand it because professional publishing corporations don't want them to.

Technically, publishing means that you create documents and you hand them out or sell them-- distribute them in some way, *making them public;* and the "publisher" is the person or company responsible.

And this is one of the greatest things in our country, that we have freedom of the press and you may publish anything you like at any time, without prior restraint, though of course you can be nailed later if you do something that's illegal or stomps on other people's feet. Thus a publisher, by law, is someone who makes things public and is consequently the person who can be sued for their contents or be put in jail. You're responsible for what you publish. We are free to publish without prior restraint, but not free from the consequences of publishing.

And this wonderful, wonderful thing called freedom of the press means you may publish anything you like. On Wednesday, or Tuesday, if you prefer, without asking anyone or without discussing it with any committee, or bringing it up before any editorial review board.

There's very little to it. Sell your work on the street corner--hand it out free if you like. When last seen, I believe Walt Whitman had a baby carriage from which he was selling copies of *Leaves of Grass* in Brooklyn Heights.

In the world of print, it can cost thousands of dollars to publish something. And in the Xanadu world, what will it take to publish a document? Well, a repository fee--about $50, let's say, to publish something the size of a novel. You're paying for three years' storage of the document in three different places on the network, and the registration fee, and you've signed a little chit saying you're taking responsibility for the contents. And so now it is published.

ROYALTY

Then there is the issue of royalty. Since it must be legitimate to publish for money, it must be possible to manage royalty automatically in tomorrow's publishing world.

"Why can't it all be free?" people say. Because that's not how the world works. I would love to walk through the world and have people give me whatever I want and never have to give anything in return. But that's not how the world works. We have to give back; only for royalty will most publishers place things in an electronic publishing system. If true on-line publishing is to be viable, royalty must be a part of it.

Automatic royalty on each small transaction, on whatever sliver someone sends for. Why only a sliver? Because in the hyperworld, you rarely will want want to buy the whole document. To look up a certain word, do you buy the whole dictionary? No, you just send for that definition.

Anyone in the world can take any fragment, paying (in their monthly Xanadu bill) an automatic royalty to some publisher for each sliver they have taken that is not in the public domain.

FREE TO QUOTE

In open hypertext publishing, you will be able to quote from any document without asking permission. How is this possible? Through the magic of transclusion.

I said before that transclusion is containing a part of one document in another without copying it. Suppose you want to quote three or four interesting documents published on the Xanadu network by authors somewhere out in the blue. Now, in the present publishing system you have to write letters, and you have to get releases and make arrangements, and so the grief and aggravation threshold is fairly high, and authors don't quote each other very much.

But in Xanadu publishing, you'll be able to transclude any material you want into your document without asking permission, because you, the quoting author, are *not copying it*. You're simply making a transclusion pointer for each quotation, telling the reader's machine where to get that quotation. As the reader gets to the part you're quoting, the reading program in his or her machine automatically sends for the transcluded material from the other document, paying automatic royalty to the rightsholder in that other document. It will also maintain automatic credit to the author of that other document, so that scholarship is perfectly sorted out. This cleans it up enormously.

You ask, "But won't you have to get permission to transclude?" No, because the original publisher has *already* given explicit permission for transclusion by signing the contract for the Xanadu publishing method.

So transclusion is a clean and simple, sweeping notion, clearing up the copyright problem enormously. It means that in this great repository, we can make many different uses of this great heritage of documents, as we must in an ongoing world.

THE XANADU GROUP

Project Xanadu, then, was meant to be my term project in the fall of 1960 for a course called "Computers in the Social Sciences" in the Harvard Department of Social Relations. That term project will finally be finished this year, when the Xanadu Group comes out with a major industrial piece of software containing this transclusive storage facility.

Of course the project has gone through many versions. Every year or so it's been a different internal design, but always to do the same thing, more generally than before. The group I assembled on a porch in Swarthmore, Pennsylvania in 1979 provided critical mass: Mark Miller, Stuart Greene, Roger Gregory, Eric Hill, Roland King and I. We sat in the shade in Swarthmore and argued all summer of 1979. We agreed on one thing: "We must have the universal library and publishing system for the human race." We argued all summer as to what you did and didn't want in the World Publishing Repository, going over some of the things I've discussed-- the meaning of freedom, privacy and publishing in tomorrow's electronic world.

Political issues as well as technical ones. At the end of the summer of 1979, they said, "Okay, Ted, we all agree on what has to be done"--which was quite a remarkable feat considering that these were brilliant and cantankerous people that couldn't agree on anything else-- and then they said, "Now go away." And that was very depressing because I had to put down this project that I had been nurturing along for 19 years, but at least it meant they would do the work,
which they understood technically better than I.

Then they labored for a decade under many circumstances; until miraculously, in February of 1988, Autodesk, Inc., a very mighty software firm--came up with money. This was because Autodesk was run by hackers--hackers in the good sense, not the newspaper sense--hackers meaning people who work tirelessly on something that they believe in. Autodesk came and started fueling the Xanadu project with millions of dollars, I can't tell you how many, and we'll have a product out next year which is intended to be this server program. The World Document Repository should begin on a small scale in 1994.

TWO COMPANIES

This one big idea of Xanadu has now been divided for practical reasons into two companies.

The server program, for users on a LAN or individually, will be from Autodesk. Xanadu Operating Company, a subsidiary of Autodesk, Inc., will be marketing this software for your generalized office applications and generalized industrial purposes.

The World Publishing Repository will be a licensing operation, vested in a company probably called Public Access Xanadu or PAX. PAX will grant licenses for publishing use of the Xanadu software, authorizing service providers to join the World Publishing Repository network. Our franchising will be rather like McDonald's', intended to assure quality and distinct, recognizable service. The service provider firms of the network will function rather like printers in the paper publishing world. (This is not an offer to sell a franchise, I must add for legal reasons.)

THE XANADU PUBLISHING PLAN

You can read all about these matters in my book, *Literary Machines*. Let me just state-- to give you a sense of the timetable-- that we hope to open the first Xanadu stand in Palo Alto sometime in 1994. But this in itself will not be a world-wide network, it will simply be a single stand with no more than 50 ports. You'll have perhaps two dozen Macs and PCs in the stand and the other ports free for dial-in. This arrangement should be saturated immediately, so we license more stands to qualified service providers.

See how it works? As demand increases, so will supply. It'll probably be only in Northern California at first. You'll be able to dial up from anywhere, but you'll have to come to California to belly up to the counter in a Xanadu stand-- where I intend to be in a polyester uniform. Then sometime in 1995 we will open in Country 2, a place with good communication service where English is prominent and freedom of the press is not an issue. And so we will immediately be international from Northern California and Country 2, with linkage and transclusion across a unified docuverse, franchised like McDonald's. It's funny, people keep saying, "What? Xanadu stands? I thought that was a metaphor!" You can tell them and tell them and tell them, but people won't believe you until you're there in your polyester uniform. So that, as much as the service itself, will be the proof.

Reality we have to take as given; virtuality is whatever we make it. Tomorrow's virtual world will consist of the conceptual and performing structures we design for the way we want to live. And that virtual world will be filled with information-- information in idiosyncratic packages created by human beings, with their own many shapes and connections-- what we have long called "documents," "works," "art pieces," "designs," "reports," and so on. Their interconnections, extending beyond paper, have in the past been lost. Designing our new virtual world to accommodate these true shapes and connections of information has been our chosen vital task.

Thank you very much.

For further information on the Xanadu system, consult *Literary Machines* by Theodor Holm Nelson, $25 from Mindful Press, 3020 Bridgeway #295, Sausalito CA 94965 ($40 foreign, including airmail), or videotape, "Technical Overview of the Xanadu Electronic Storage and Publishing System," VHS only, $50 ($65 foreign, including airmail.)